Zoological Systematics, 43(2): 196–210 (April 2018), DOI: 10.11865/zs.201818

ORIGINAL ARTICLE

Seven new species of the genus *Circobotys* Butler from China (Lepidoptera: Crambidae), with a checklist of the world

Qiang Gao, Shuxia Wang*

College of Life Sciences, Nankai University, Tianjin 300071, China
**Corresponding author, E-mail: shxwang@nankai.edu.cn*

Abstract Seven *Circobotys* species are described as new from China: *C. albimarginata* Wang, **sp. nov.**, *C. unicolor* Wang, **sp. nov.**, *C. serratilinearis* Wang, **sp. nov.**, *C. sinuata* Wang, **sp. nov.**, *C. flavimarginalis* Wang, **sp. nov.**, *C. minutimacularis* Wang, **sp. nov.** and *C. obscuriptera* Wang, **sp. nov.** Photographs of adults and genitalia of the new species are provided, along with a map showing the distribution of the species in China. A checklist of the genus *Circobotys* Butler of the world is given.

Key words Microlepidoptera, Pyraloidea, Pyraustinae, Pyraustini, description.

1 Introduction

The genus *Circobotys* belongs to the tribe Pyraustini in the subfamily Pyraustinae of the family Crambidae. It was erected by Butler in 1879, with *C. nycterina* Butler, 1879 as its type species. For a long time, some species in *Circobotys* were mixed with species in different genera such as *Botyodes*, *Botys*, *Crambus*, *Hapalia*, *Omiodes*, *Phlyctaenodes* and *Stenia*, especially in *Crocidophora* (Nuss *et al.*, 2003–2016). Mutuura (1954) transferred Japanese species *C. aurealis* (Leech, 1889) from *Botyodes* and *C. heterogenalis* (Bremer, 1864) from *Omiodes*. Munroe & Mutuura (1969) described four species and three subspecies (now in species rank) from China and Japan. Munroe & Mutuura (1970) described one species and combined three species from East Asia. Shaffer *et al.* (1996) transferred Australian species *C. occultilinea* (Walker, 1863) from the genus *Crambus* and Maes (2014) transferred four African species to the present genus. Prior to this study, the genus *Circobotys* consists of 20 species that are distributed in the African, Palaearctic, Oriental and Australian regions (Nuss *et al.*, 2003–2016).

Eleven species and two subspecies were recorded to occur in China prior to this study. In the present paper, we describe seven new species based on the specimens in the Insect Collection of Nankai University, Tianjin, China.

2 Materials and methods

Adult specimens examined in the present study were collected by light traps from Fujian, Guangxi, Guizhou, Hainan, Henan, Hubei, Hunan, Jiangxi, Shaanxi, Sichuan, Yunnan and Zhejiang Provinces. Genitalia and wing venation were dissected and mounted according to the methods introduced by Li (2002). Photographs of adults were taken with a Leica M250A stereo microscope, and illustrations of the genitalia were prepared by using Leica DM750 microscope.

The types of the new species are deposited in Insect Collection of Nankai University (NKU), Tianjin, China.

urn:lsid:zoobank.org:pub:F2078D57-E217-4B7F-AC95-5C5FA9E0AEFD
Received 11 February 2017, accepted 10 March 2018
Executive editor: Fuqiang Chen

3 Taxonomy

Genus *Circobotys* Butler, 1879

Circobotys Butler, 1879: 77. Type species: *Circobotys nycterina* Butler, 1879, by original designation.
Circobotis Mutuura, 1954: 14. (misspelling).

Generic characters. Frons slightly rounded and convex. Labial palpus porrect, exceeding frons by about 1.5 times as long as length of head, third segment slightly drooping. Maxillary palpus developed, slightly dilated with scales distally. Forewing with costal margin somewhat straight, apex sharp or obtuse, termen roundly oblique or straightly truncate, tornus obtuse; cell about half length of wing, R_1 from 4/5 of anterior margin, R_3 and R_4 stalked about 2/3 distance from upper corner to apex, M_1 from about middle, M_2 and M_3 from posterior angle, CuA_1 from before posterior angle, CuA_2 from 2/3 of posterior margin. Hindwing with cell about 1/3 length of wing; $Sc+R_1$ and Rs anastomosed for half-length of Rs; M_2, M_3 and CuA_1 from posterior angle, approximated at base; CuA_2 from 3/4 of posterior margin (Fig. 1).

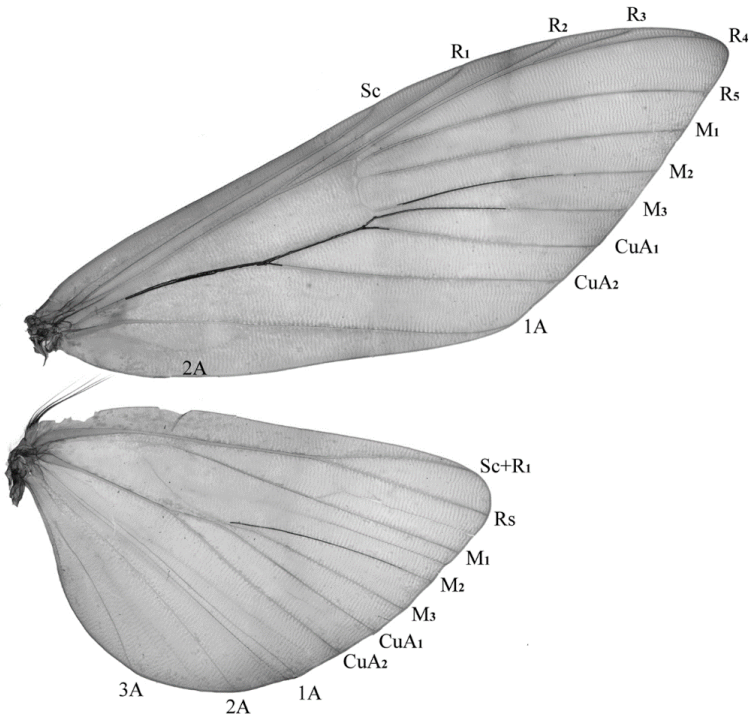
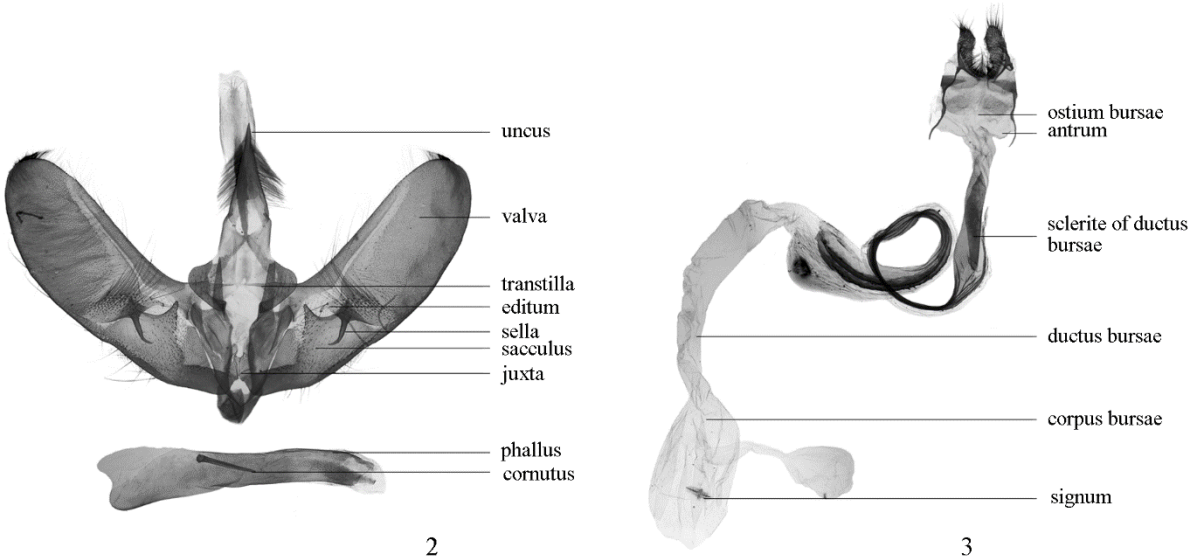


Figure 1. Wing venation of *Circobotys aurealis*.



Figures 2–3. Genitalia of *C. heterogenalis*. 2. Male. 3. Female.

Male genitalia (Fig. 2). Uncus mostly sub-triangular, setose, pointed apically. Transtilla short or elongate triangular; valva broad, or narrowly elongate; sella and editum present or absent; sacculus usually with a thumb-shaped or triangular dorsal process. Phallus cylindrical; cornutus present or absent, often spine-like if present.

Female genitalia (Fig. 3). Papillae anales densely setose. Apophyses slender. Antrum short. Ductus bursae with long sclerite posteriorly. Corpus bursae oval, with appendix bursae; sigum mostly rhomboid.

Distribution. China (Anhui, Beijing, Chongqing, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Ningxia, Shaanxi, Shandong, Shanxi, Sichuan, Taiwan, Tianjin, Yunnan, Zhejiang) (Fig. 4), Korea, Japan, Russia (Siberia and Far East), India, Burma, Malaysia and Australia.

Remarks. *Circobotys* is relatively rich in China. Of the 20 described species in the world, 11 species were recorded to occur in China. In this study, we identified eight known Chinese species on the examination of the available specimens in our collection. However, we are unable to get the specimens of *C. arrogantalis* (Tams, 1927), *C. elongata* Munroe & Mutuura, 1969 and *C. plebeia* Munroe & Mutuura, 1969. The species lacking specimens for investigation or with untraceable types are distinguished based on the original descriptions when establishing new taxa.

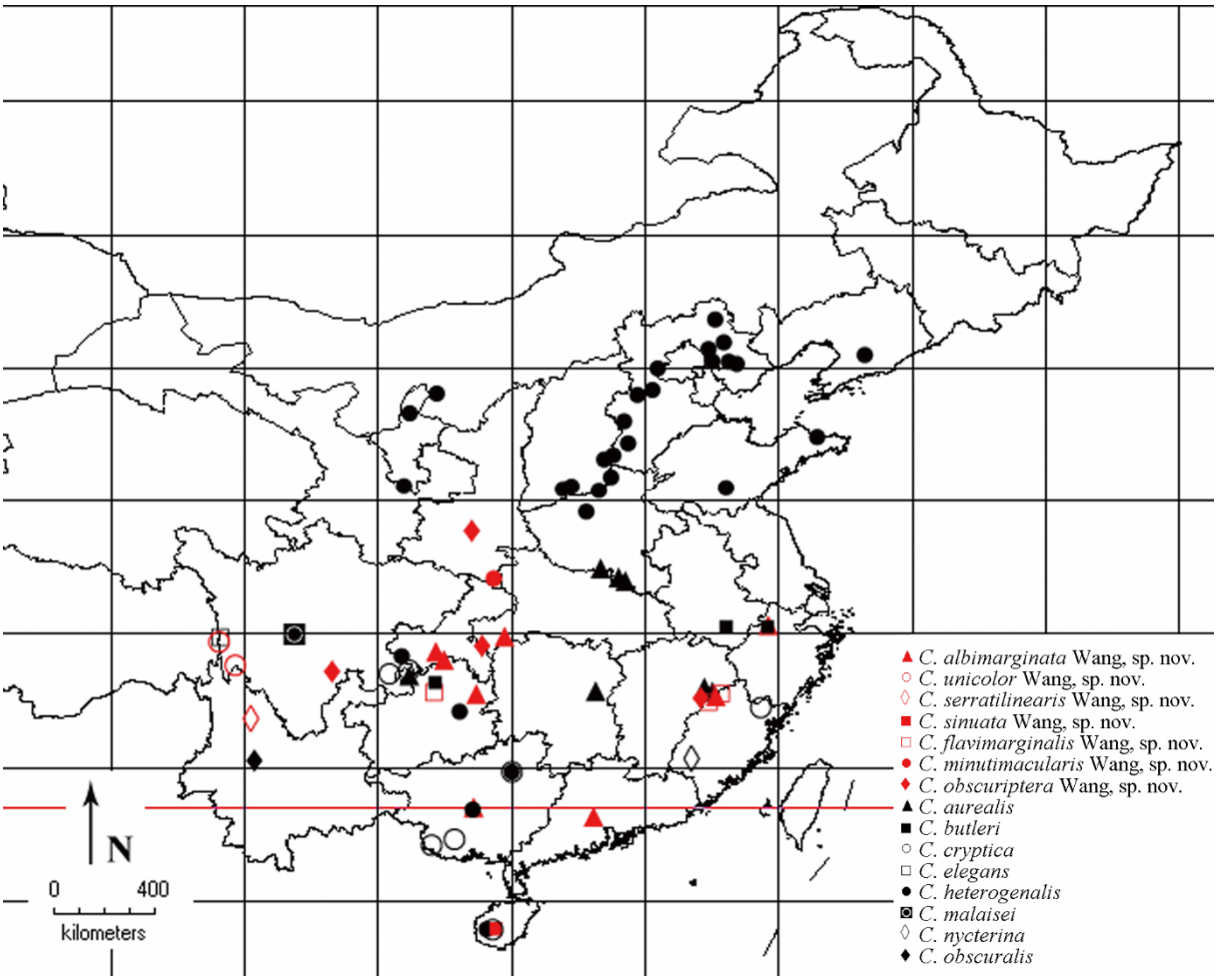


Figure 4. Distribution of *Circobotys* species in China.

***Circobotys albimarginata* Wang, sp. nov.** (Figs 5–6, 13, 20)

Diagnosis. This species is similar to *C. cryptica* Munroe & Mutuura, 1969 superficially, but can be differentiated by the valva nearly parallel sided dorso-ventrally, the dorsal process of the sacculus longer than wide, the sella with the sub-rectangular basal part not produced to a sharp process, and the cornutus spine-like in the male genitalia. In *C. cryptica*, the ventral margin of the valva is arched, the dorsal process of the sacculus is wider than long, the sella has a slightly broad base that protrudes to before the end of the sacculus and forms a sharp process, and the cornutus is absent.

Description. Male adult (Fig. 5) wingspan 31.0–36.0 mm. Vertex and frons pale yellowish brown or deep yellowish

brown, frons with white stripe laterally. Labial palpus with first segment white; second segment fuscous except somewhat white at base; third segment fuscous or pale brown. Maxillary palpus brown. Antenna fuscous or pale brown, scape white on anterior margin. Tegula and thorax fuscous, thorax with fine setae ventrally. Forewing narrowly elongate; costal margin straight; apex curved downward, somewhat hook-shaped with fuscous cilia; termen obliquely truncate, longer than length of dorsal margin; dorsal margin arched basally, shallowly concave distally. Ground color brown or pale yellowish brown, patterns fuscous: antemedian line from basal 1/6 of costal margin to basal 2/5 of dorsal margin; orbicular stigma faint, extremely faint in some specimens; distal discoidal stigma somewhat crescent; postmedian line from distal 1/4 of costal margin oblique to basal 1/3 of M_1, then incurved to middle of CuA_1, transversely to base of CuA_2, finally to basal 3/5 of dorsal margin through basal 1/3 of 1A. Hindwing broad, triangular, brown or pale brown, area covered by forewing yellowish white; postmedian line fuscous, from middle of M_1 incurved to junction of 1A and 2A. Cilia of wings brown except median 1/3 buff. Wings paler on ventral surface.

Female adult (Fig. 6) wingspan 29.0–32.0 mm. Vertex and frons brown. Labial palpus with third segment brown. Maxillary palpus brown with paler apex. Antenna pale brown, scape and basal flagellomeres white on anterior margin. Thorax without fine setae ventrally. Forewing broad; costal margin straight; apex slightly curved downward; termen obliquely inward, shorter than length of dorsal margin; dorsal margin slightly arched. Ground color pale yellowish brown, deepening from base to apex, patterns blackish brown: antemedian line from basal 1/4 of costal margin oblique to basal 2/5 of dorsal margin; orbicular stigma rounded, small, invisible in some individuals; postmedian line from basal 2/3 of costal margin oblique to middle of M_1, then incurved to basal 1/3 of CuA_2 through basal 1/4 of CuA_1, finally straight to basal 1/3 of dorsal margin. Hindwing with postmedian line from basal 2/3 of M_1 to middle of CuA_2, arched outward. Cilia of wings buff except forewing black at apex.

Male genitalia (Fig. 13). Uncus broad at base, gradually narrowed to basal 3/5, distal 2/5 extremely narrow, tapering to sharp apex. Valva nearly parallel sided dorso-ventrally, length about 3 times maximum width, distal 1/6 slightly narrowed to obtuse apex; costa straight, almost reaching end of costal valva; sacculus produced semicircularly and arched dorsally, with a finger-shaped dorsal process. Editum spine-like, reaching beyond dorsal process of sacculus; sella sub-rectangular basally, hook-shaped distally; small sharp process set between sella and editum at base, sometimes invisible. Juxta formed by two reniform lobes connected basally. Phallus slightly longer than valva, almost straight; cornutus spine-like, about 1/5 length of phallus.

Female genitalia (Fig. 20). Apophyses anteriores about 2 times as long as apophyses posteriores. Ostium bursae surrounded by thin sclerite. Antrum short, somewhat funnel-shaped. Ductus bursae with sclerite throughout posterior 3/5, this sclerite serrate on right side along posterior 1/3, edged with dentations along anterior 1/3 on outer sides; ductus seminalis arising from ductus bursae posteriorly. Signum with a median transversal carina sharply protruded on both ends.

Material examined. Holotype ♂, Daozhen County (29º09′N, 107º25′E; elev. 1300 m), Guizhou, 20 August 2004, coll. Yunli Xiao, genitalia slide No. GQ11184. Paratypes. 4♂, 24 August 2004, others same as holotype; 13♂12♀, Mt. Tianmu (30º16′N, 119º20′E), Zhejiang, 17–19 August 1999, coll. Houhun Li; 1♂, Mt. Wuyi (27º48′N, 117º39′E; elev. 900 m), Jiangxi, 13 August 2007, coll. Jiasheng Xu; 1♂, Mt. Baiyun, Chong County (23º10′N, 113º17′E; elev. 1580 m), Henan, 18 July 2002, coll. Xinpu Wang; 3♂3♀, Mt. Badagong (29º40′N, 109º48′E; elev. 1250 m), Hunan, 12–13 August 2001, coll. Houhun Li and Xinpu Wang; 1♀, Mt. Daming (23º24′N, 108º29′E; elev. 1500 m), Guangxi, 25 August 2012, coll. Xiaofei Yang and Zhenguo Zhang; 5♂1♀, Mt. Fanjing (27º50′N, 108º46′E; elev. 1300 m), Guizhou, 1–4 August 2001, coll. Houhun Li and Xinpu Wang; 1♀, Dashahe, Daozhen County (28º52′N, 107º37′E; elev. 1350 m), Guizhou, 24 August 2004, coll. Yunli Xiao.

Distribution. China (Guangxi, Guizhou, Henan, Hunan, Jiangxi, Zhejiang).

Etymology. The specific name is from the Latin *albus*, meaning white, and *marginatus*, meaning margin, referring to the white posterior margin of each abdominal segment dorsally.

Remarks. The male and female adults of this species vary obviously. Females have broader and more opaque wings, but the male and female genitalia of specimens collected from different areas show no significant variation.

***Circobotys unicolor* Wang, sp. nov.** (Figs 7, 14, 21)

Diagnosis. This species is superficially similar to *C. aurealis* (Leech, 1889) in female, but can be differentiated by the sacculus with a small triangular dorso-medial process, the short triangular editum, and the phallus without spines in the male genitalia; the sclerite in the ductus bursae without dentations anteriorly, and the signum rounded on the anterior margin in the female genitalia. In *C. aurealis*, the sacculus has a finger-shaped dorsal process, the editum is slender triangular, and the phallus has three to four spines; the sclerite of the ductus bursae has dentations anteriorly, and the signum is flat on the anterior margin.

Description. Adult (Fig. 7) wingspan 23.0–25.0 mm. Vertex and frons yellow or buff, frons with white or yellowish

white stripe laterally. Labial palpus with first segment buff; second and third segments yellow to buff. Maxillary palpus yellow to buff. Antenna yellow, scape and basal flagellomeres white on anterior margin. Tegula and thorax yellow to buff dorsally, grayish white ventrally. Abdomen yellow to buff on dorsal surface, grayish white on ventral surface. Forewing triangular, relatively small compared with other species; costal margin straight except slightly arched before apex; apex rounded; termen bluntly arched, shorter than length of dorsal margin; dorsal margin almost straight; uniformly orange, deeper along costa margin, termen and dorsal margin; cilia yellow to buff. Hindwing gray tinged with yellow; cilia buff. Ventral surface of wings concolorous with dorsal surface.

Male genitalia (Fig. 14). Uncus broad basally, gradually narrowed to 5/6, distal 1/6 sharply narrowed to a point. Valva broad, only slightly narrower at base, bluntly rounded at apex; costa straight, narrowed from base to pointed tip, reaching distal 1/5 of costal valva apically; ventral margin arched; sacculus widely protruded dorsally, with a small triangular dorso-medial process. Editum small, triangular; sella spine-like, slightly curved, extending ventrad to sacculus. Juxta with median indentation anteriorly, broadly concave posteriorly, lateral lobes narrowed to pointed tip. Phallus short and thick, shorter than valva; cornutus spine-like.

Female genitalia (Fig. 21). Apophyses anteriores approximately 1.7 times as long as apophyses posterioreis. Ductus bursae with broad sclerite throughout posterior half, dilated anterior to sclerite, sclerite with fine carina along anterior 2/3. Signum blunt at both ends of transversal median ridge, posterior margin medially produced to a small process, anterior margin rounded.

Material examined. Holotype ♂, Zhubalong, Batang County (29º47′N, 99º06′E; elev. 2500 m), Sichuan, 10 July 2001, coll. Houhun Li and Xinpu Wang, genitalia slide No. GQ11237. Paratypes. 12♂11♀, 10–11 July 2001, other same as holotype; 1♂1♀, Xiangcheng County (28º56′N, 99º48′E; elev. 2800 m), Sichuan, 13 July 2001, coll. Houhun Li and Xinpu Wang.

Distribution. China (Sichuan).

Etymology. The specific name is from the Latin *unicolor*, referring to the uniformly colored wings.

***Circobotys serratilinearis* Wang, sp. nov.** (Figs 8, 15, 22)

Diagnosis. This species is similar to *C. cryptica* Munroe & Mutuura, 1969 superficially, but it can be differentiated by the sacculus with a narrow triangular dorsal process, the sella with not extending to sacculus, and the vesica with an irregular sclerite in the male genitalia. In *C. cryptica*, the sacculus has a short thumb-shaped dorsal process, the sella basally protrudes to the sacculus and forms a sharp process, and the vesica lacks a sclerite.

Description. Adult (Fig. 8) wingspan 28.0–29.0 mm. Vertex and frons buff, frons with creamy white stripe laterally. Labial palpus with first segment white ventrally, pale yellowish brown dorsally; second segment tinged with white ventrally, pale yellowish brown dorsally; third segment pale yellowish brown. Maxillary palpus pale yellowish brown. Antenna buff, scape and basal flagellomeres white on anterior margin. Tegula and thorax buff. Abdomen buff dorsally, dirty white ventrally. Forewing slightly narrow; costal margin straight except slightly arched before apex; termen obliquely truncate, shorter than length of dorsal margin; apex slightly curved downward; dorsal margin slightly arched. Ground color of forewing buff, patterns pale brown: antemedian line from basal 1/5 of costal margin to basal 1/3 of dorsal margin, curved, forming an angle between lower margin of cell and 1A; orbicular stigma a round small dot; distal discoidal stigma stripe-shaped; postmedian line from costal 4/5 to dorsal 2/3, serrate; cilia yellow. Hindwing with termen arched; postmedian line pale brown, from costal 4/5 to middle of CuA_2, finally directing to middle of dorsal margin; cilia buff. Patterns on ventral surface of wings more distinct.

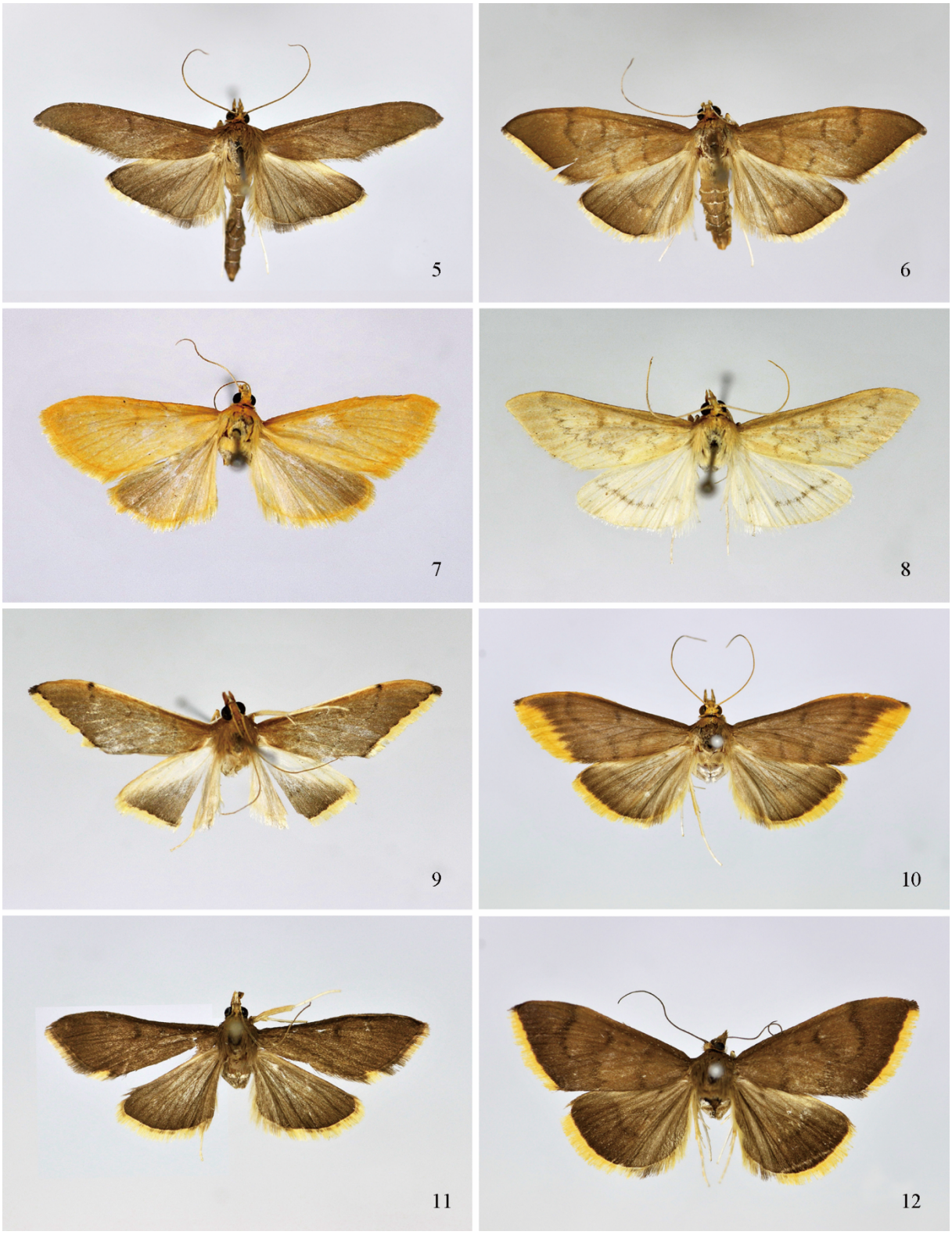
Male genitalia (Fig. 15). Uncus broad basally, gradually narrowed to 3/5, setose medially; distal 2/5 extremely narrow, pointed at apex, without setae. Valva with basal 2/3 parallel sided dorso-ventrally, distal 1/3 slightly narrowed to obtuse apex; costa straight, slightly narrowed distally, reaching before end of costal valva; sacculus protruded dorsally, with a narrow triangular dorsal process apically reaching ventral margin of costa. Sella spine-like, slender, incurved distally. Juxta with posterior, anterior and lateral margins concave medially, forming a butterfly shape. Phallus slender, shorter than valva, distally with a toothed sclerite, serrate on dorsal margin; vesica with an irregular sclerite; cornutus small, spine-like, placed distally.

Female genitalia (Fig. 22). Apophyses anteriores approximately 1.5 times as long as apophyses posteriores. Ductus bursae slightly inflated posteriorly; sclerite along posterior 2/3, with a longitudinal carina, with a slender thumb-shaped process produced from anterior end of sclerite; ductus seminalis with a spur at base. Signum sharp at both ends of transversal median carina, posterior margin with a small thumb-shaped process medially, anterior margin roundly convex.

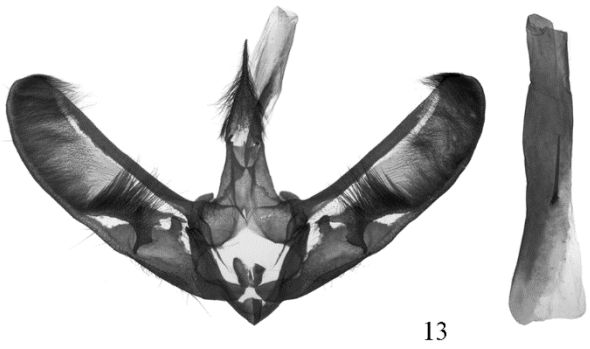
Material examined. Holotype ♂, Wenfeng Temple (26º48′N, 100º14′E; elev. 2650 m), Lijiang, Yunnan, 16 July 2001, coll. Houhun Li and Xinpu Wang, genitalia slide No. ZDD02040. Paratypes. 1♂1♀, 18 July 2001, others same as holotype.

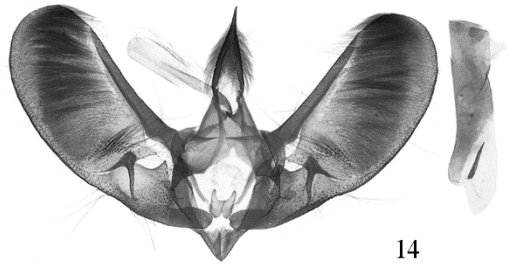
Distribution. China (Yunnan).

Etymology. The specific name is from the Latin *serratus*, meaning serrate, and *linearis*, meaning line, referring to the serrate postmedian line of the forewing.

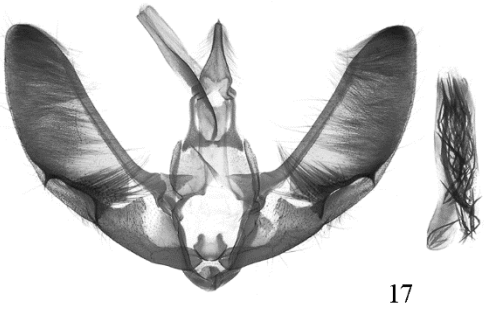


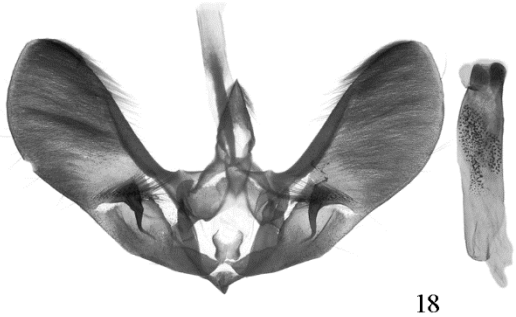
Figures 5–12. Adults of *Circobotys* spp. 5–6. *C. albimarginata* Wang, **sp. nov.** 5. ♂, paratype. 6. ♀, paratype. 7. *C. unicolor* Wang, **sp. nov.**, ♀, paratype. 8. *C. serratilinearis* Wang, **sp. nov.**, ♂, holotype. 9. *C. sinuata* Wang, **sp. nov.**, ♂, holotype. 10. *C. flavimarginalis* Wang, **sp. nov.**, ♀, paratype. 11. *C. minutimacularis* Wang, **sp. nov.**, ♂, holotype. 12. *C. obscuriptera* Wang, **sp. nov.**, ♀, paratype.

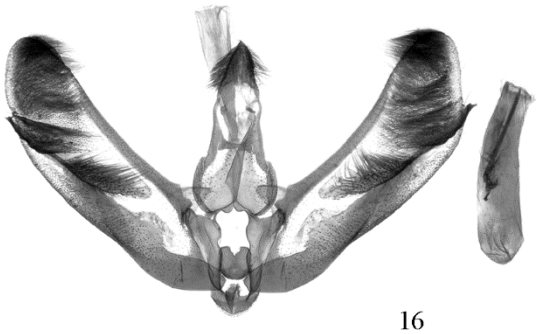

13

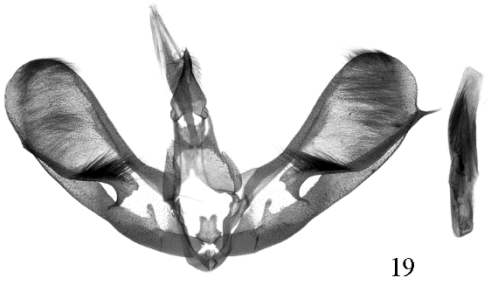

14


15


17


18


16


19

Figures 13–19. Male genitalia of *Circobotys* spp. 13. *C. albimarginata* Wang, **sp. nov.** (Holotype, slide No. GQ11184). 14. *C. unicolor* Wang, **sp. nov.** (Holotype, slide No. GQ11237). 15. *C. serratilinearis* Wang, **sp. nov.** (Holotype, slide No. ZDD02040). 16. *C. sinuata* Wang, **sp. nov.** (Holotype, slide No. GQ11187). 17. *C. flavimarginalis* Wang, **sp. nov.** (Holotype, slide No. GQ11235). 18. *C. minutimacularis* Wang, **sp. nov.** (Holotype, slide No. GQ11231). 19. *C. obscuriptera* Wang, **sp. nov.** (Holotype, slide No. GQ11188).

***Circobotys sinuata* Wang, sp. nov.** (Figs 9, 16)

Diagnosis. This species is similar to *C. elongata* Munroe & Mutuura, 1969 superficially. It can be distinguished by the uncus with distal part not so long and sharp as its congeners, the absence of the sella, the editum extending to beyond end of the sacculus and forming a outward distal process, the sacculus with a bluntly arched process at dorsal 1/2, and the cornutus long spine-like. In *C. elongata*, the distal 2/3 of the uncus is extremely long and sharp, the sella is broad, the editum protrudes to the end of the sacculus and forms a downward distal process, the sacculus has a triangular dorsal process, and the cornuti are a pair of symmetrically disposed patches.

Description. Male adult (Fig. 9) wingspan 29.5 mm. Vertex and frons yellowish brown, frons with white stripe laterally. Labial palpus with first segment snowy white except tinged with yellowish brown dorsally; second segment snowy white

ventrally, yellowish brown dorsally; third segment yellowish brown. Maxillary palpus yellowish brown, paler at apex. Antenna yellowish brown. Tegula and thorax pale yellowish brown. Abdomen white ventrally, brown dorsally. Forewing triangula; costal margin straight except slightly arched before apex, yellowish white; termen obliquely truncate, equal to length of dorsal margin; apex bent downward; dorsal margin straight. Ground color pale yellowish brown, patterns blackish brown: antemedian line from basal 1/6 of costal margin to basal 1/3 dorsal margin; distal discoidal stigma short stripe-shaped; postmedian line from costal 3/4 obliquely to 2/5 of M_2, then to basal 1/3 of CuA_2 through basal 1/3 of CuA_1, finally to dorsal 2/3, more distinct anteriorly; terminal line evenly sinuate, black, interrupted by yellow scales at tip of veins. Hindwing blackish brown, except area paler under forewing; postmedian line blackish brown, from base of M_3 to middle of 1A. Cilia of wings yellow except black at apex of forewing. Wings paler on ventral surface.

Male genitalia (Fig. 16). Uncus broad triangular, with a short fine distal spine. Valva narrow, basal 3/4 sub-parallel sided dorso-ventrally, distal 1/4 slightly narrowed toward rounded apex; transtilla triangular; costa nearly straight, reaching basal 3/4 of costal valva; sacculus relatively broad, about 1.5 times as long as costa, with a bluntly arched process at middle on dorsal margin; sella absent; editum extended to beyond end of sacculus where a sharp distal process is formed. Juxta sub-rounded, with median incision posteriorly. Phallus short, about half length of valva; cornutus spine-like, about half length of phallus.

Female unknown.

Material examined. Holotype ♂, Yinggeling (19º12′N, 109º19′E; elev. 620 m), Hainan, 7 July 2009, coll. Zhaohui Du and Linlin Yang, genitalia slide No. GQ11187.

Distribution. China (Hainan).

Etymology. The specific name is from the Latin word *sinuatus*, meaning sinuate, referring to the sinuate terminal line of the forewing.

***Circobotys flavimarginalis* Wang, sp. nov.** (Figs 10, 17, 23)

Diagnosis. This species is similar to *C. plebeia* Munroe & Mutuura, 1969 superficially, but it can be differentiated by the valva broadened medially and narrowed toward base and apex, the triangular sella produced to a sharp process before the end of the sacculus, and the strong and curved cornutus. In *C. plebeia*, the valva is subparallel dorso-ventrally, the spine-like sella is not produced to a process, and the cornuti consist of four short parallel subequal spines.

Description. Adult (Fig. 10) wingspan 25.0–35.0 mm. Vertex and frons yellow to yellowish brown, frons with white stripe laterally. Labial palpus with first and second segments snowy white ventrally, dark yellowish brown dorsally; third segment dark yellowish brown. Maxillary palpus yellowish brown, paler at apex. Antenna dark grayish brown, scape and basal flagellomeres white on anterior margin. Tegula and thorax deep yellowish brown, thorax with many fine setae ventrally. Abdomen ventrally yellowish white except yellow on end; dorsally yellowish brown to dark yellowish brown, white on posterior margin of each segment. Forewing broad, sub-triangular; costal margin with basal half straight, distal half arched, dark brown basally, yellow distally; apex protruding triangularly, curved downward; termen obliquely truncate, shorter than length of dorsal margin; dorsal margin slightly arched basally. Ground color dark yellowish brown, with a narrow orange band along termen, with a stripe-shaped translucent areas between Sc and R_1 as well as between Sc and costa at base; patterns fuscous: antemedian line from basal 1/3 of 1A nearly to middle of dorsal margin; orbicular stigma extremely faint; distal discoidal stigma a short stripe, somewhat lunate; postmedian line from basal 2/3 of costal margin oblique to basal 3/5 of M_1, then incurved to basal 1/3 of CuA_2 through basal 1/3 of M_3, finally to basal 2/3 of dorsal margin through basal 2/3 of 1A. Hindwing pale brown basally, deepening toward termen, area covered by forewing yellowish white; postmedian line fuscous, from basal 3/4 of costal margin to middle of CuA_2. Cilia orange except dark brown at apex of forewing and pale brown at anal angle of hindwing. Patterns of wings distinct on ventral surface.

Male genitalia (Fig. 17). Uncus broad at base, gradually narrowed to middle, distal half almost uniformly narrow, with a short apical spine. Valva broadened medially, narrowed toward base and apex, ventral margin arched, apex narrowly rounded; costa slightly concave at base, extending to 3/4 of costal valva; sacculus with a strong dorsal process at middle, its apex more or less truncate. Sella triangular, inner edge less sclerotized than outer edge, produced to a sharp process reaching before end of sacculus. Juxta nearly axe-shaped, anterior margin rounded, posterior margin concave medially. Phallus short and thick, about half length of valva, with a bundle of spines; cornutus strong, spine-like, curved, about 2/3 length of phallus.

Female genitalia (Fig. 23). Apophyses anteriores approximately 2 times as long as apophyses posteriores. Antrum laterally produced backward, forming a U shape. Ductus bursae with a broad anteriorly serrated sclerite, bearing a thumb-shaped process protruding from anterior end of this sclerite. Signum sharply pointed at both ends of transversal median ridge, posterior margin with a small triangular process medially, anterior margin slightly concave medially.

Material examined. Holotype ♂, Mt. Wuyi (27º48′N, 117º39′E; elev. 900 m), Jiangxi, 13 August 2007, coll. Jiasheng

Xu, genitalia slide No. GQ11235. Paratypes. 1♂, same data as holotype; 21♂, San'gang (27º44′N, 117º40′E; elev. 740 m), Fujian, 17–19 May 2004, coll. Haili Yu, 25–26 July 2008, coll. Weichun Li *et al.*; 2♂, Mt. Xianfengling (27º45′N, 118º18′E; elev. 1000 m), Mt. Wuyi, Fujian, 26 May 2004, coll. Haili Yu; 1♀, Guadun (27º44′N, 117º38′E; elev. 1100 m), Mt. Wuyi, Fujian, 22 May 2004, coll. Haili Yu; 1♂, Kuankuoshui Nature Reserves (28º14′N, 107º12′E; elev. 1500 m), Suiyang County, Guizhou, 16 August 2010, coll. Xicui Du.

Distribution. China (Fujian, Guizhou, Jiangxi).

Etymology. The specific name is from the Latin word *flavus*, meaning yellow, and *marginalis*, meaning margin, referring to the orange band along the termen of the forewing.

Remarks. Six specimens from Fujian Province are similar to *C. flavimarginalis* Wang, **sp. nov.** morphologically, but the adult color is paler, the valva is obtuse apically and the phallus has a long strong curved cornutus but without spines in the male genitalia. They may represent a new taxon, but needing female information to confirm. In this paper, we do not include them in the type series.

***Circobotys minutimacularis* Wang, sp. nov.** (Figs 11, 18)

Diagnosis. This species is similar to *C. plebeia* Munroe & Mutuura, 1969 superficially. It can be differentiated by the uncus with distal part not so long and sharp as its congeners, the valva widest at basal 2/3 and gradually narrowed toward base and apex, the juxta with a pair of short posterolateral lobes, and the absence of the cornutus. In *C. plebeia*, the distal 2/3 of the uncus is extremely long and sharp at apex, the valva is subparallel dorso-ventrally, the juxta doesn't form posterolateral lobes, and the cornutus is spine-like.

Description. Adult (Fig. 11) wingspan 26.2–27.2 mm. Vertex and frons yellowish brown. Labial palpus with first and second segments white ventrally, yellowish brown dorsally; third segment yellowish brown. Maxillary palpus pale yellowish brown. Antenna dark yellowish brown. Tegula and thorax dark yellowish brown. Abdomen ventrally pale yellowish brown, dorsally dark yellowish brown except white on posterior margin of each segment. Forewing triangular, slightly narrowed; costal margin with basal half straight, dark brown, distal half slightly arched, deep yellow; apex curved downward; termen obliquely truncate, shorter than length of dorsal margin; dorsal margin arched before apex; tornus with a small yellow spot. Ground color dark yellowish brown, pattern dark brown; orbicular stigma a round small dot; distal discoidal stigma line-shaped, thick and slightly excurved; postmedian line faint, starting from basal 3/4 of costal margin, becoming invisible posteriorly; cilia of forewing yellow, with a dark yellowish brown subbasal line, tinged with dark brown on termen posteriorly and on tornus. Hindwing without patterns, termen arched; cilia yellow, with discontinuous dark brown subbasal line.

Ventral patterns more distinct. Forewing with postmedian line from basal 3/4 of costal margin to basal 1/3 of M_1, then excurved straightly to basal 1/3 of CuA_1, and obliquely to basal 1/3 of 1A, invisible posteriorly. Hindwing with postmedian line from basal 2/3 of costal margin oblique to 1/4 of CuA_1, finally to 1/3 of 2A through 1/3 of CuA_2.

Male genitalia (Fig. 18). Uncus triangular, produced to a short distal spine. Valva broad, widest at basal 2/3, gradually narrowed toward base and apex, apex narrowly rounded, ventral margin sinuate; costa slightly concave at base, reaching basal 2/3 of costal valva, ending with a pointed tip; sacculus with an extremely large triangular dorsal process, reaching beyond base of sella apically; sella hook-shaped, broad at base. Juxta with posterior, anterior and lateral margins concave medially, forming a pair of short bifid posterolateral lobes; outer edge more sclerotized than inner edge. Phallus slightly shorter than valva, without distinct cornutus; vesica with a granulous sclerite.

Female unknown.

Material examined. Holotype ♂, Mt. Hualong, Ankang (32º12′N, 109º21′E; elev. 2150 m), Shaanxi, 27 June 2003, coll. Haili Yu, genitalia slide No. GQ11231. Paratype. 1♂, same data as holotype.

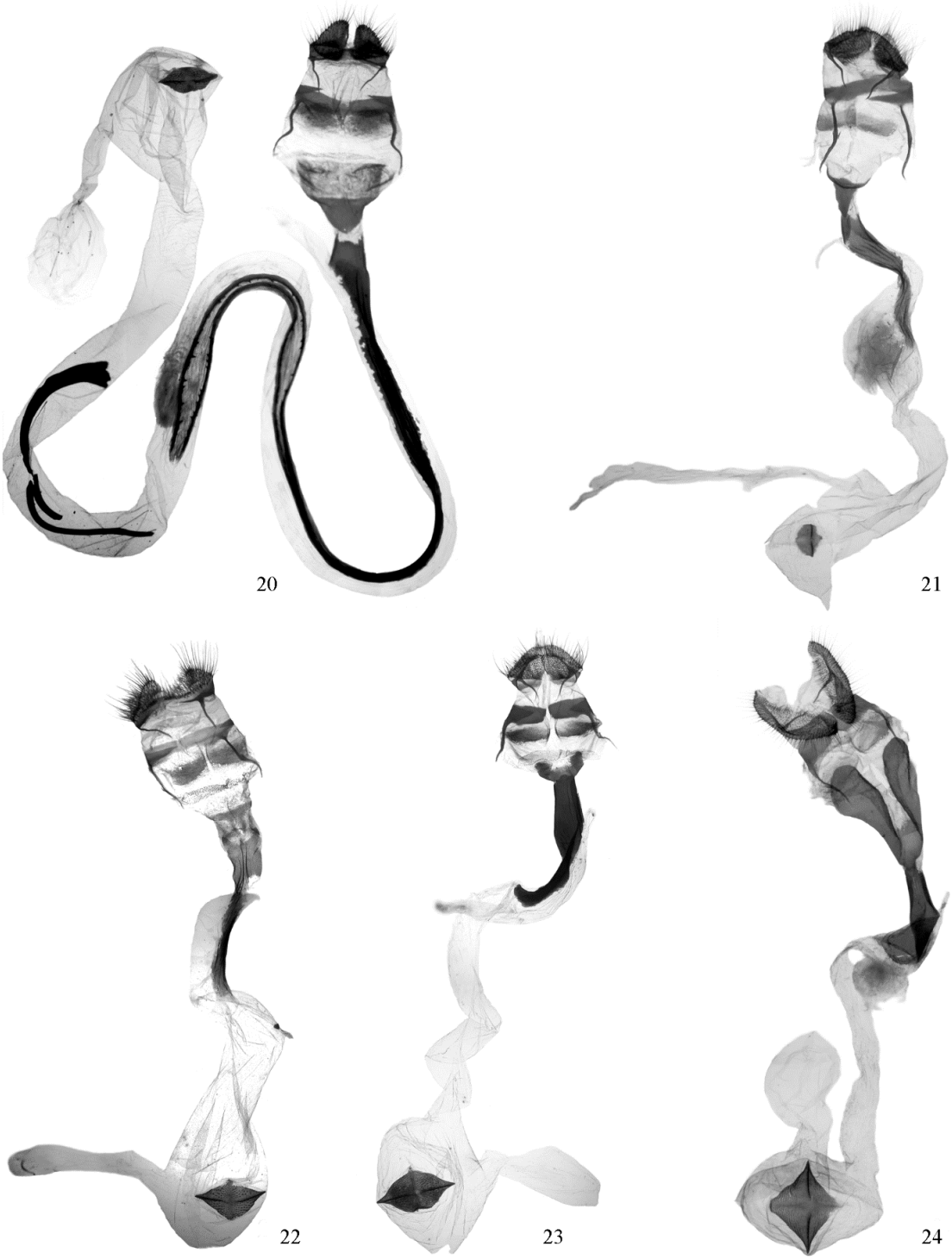
Distribution. China (Shaanxi).

Etymology. The specific name is from the Latin *minutus*, meaning diminished, and the Latin word *macularis*, meaning spot, referring to the small yellow spot at the tornus of the forewing.

***Circobotys obscuriptera* Wang, sp. nov.** (Figs 12, 19, 24)

Diagnosis. This species is similar to *C. plebeia* Munroe & Mutuura, 1969 superficially. It can be differentiated by the broad valva with basal half narrower slightly narrower, the sacculus with a slender finger-shaped dorsal process, and the sella basally produced to end of the sacculus and forming a sharp process in the male genitalia. In *C. plebeia*, the valva is subparallel dorso-ventrally, the sacculus has a triangular dorsal process, and the sella is not produced basally to form a process.

Description. Adult (Fig. 12) wingspan 24.0–30.0 mm. Vertex and frons dark yellowish brown. Labial palpus with first segment snowy white except tinged with brown dorsally; second segment dark yellowish brown except tinged with white ventrally; third segment dark yellowish brown. Maxillary palpus brown. Antenna dark grayish brown. Tegula and thorax dark yellowish brown. Abdomen ventrally pale brown, dorsally dark brown except white on posterior margin of each segment. Forewing broad triangular; costal margin straight except slightly arched before apex; apex slightly curved downward; termen obliquely truncate, shorter than length of dorsal margin; dorsal margin almost straight. Ground color dark



Figures 20–24. Female genitalia of *Circobotys* spp. 20. *C. albimarginata* Wang, **sp. nov.** (slide No. GQ11215). 21. *C. unicolor* Wang, **sp. nov.** (slide No. GQ11239). 22. *C. serratilinearis* Wang, **sp. nov.** (slide No. GQ11240). 23. *C. flavimarginalis* Wang, **sp. nov.** (slide No. GQ11230). 24. *C. obscuriptera* Wang, **sp. nov.** (slide No. GQ11198).

yellowish brown, patterns blackish brown: antemedian line from basal 1/3 of costal margin to basal 2/5 of dorsal margin, almost straight; orbicular stigma rounded, small, not obvious in some individuals; distal discoidal stigma somewhat semilunate; postmedian line from basal 3/4 of costal margin to basal 2/5 of R_5, then to middle of CuA_2 through middle of M_2, M_3 and CuA_1, arched outward, finally to basal 2/3 of dorsal margin, serrate; terminal line blackish brown, sinuate. Hindwing dark yellowish brown, area covered by forewing yellowish white; termen arched; postmedian line brown, from basal 2/3 of costal margin to CuA_2. Cilia of wings yellow, basal line buff; apex of forewing with dark brown cilia. Ventral patterns of wings more distinct.

Male genitalia (Fig. 19). Uncus broad at base, gradually narrowed to middle, distal half almost uniformly narrow, produced to a short spine apically. Valva broad, basal half slightly narrower than distal half, bluntly rounded at apex; costa somewhat concave before middle, distal 1/6 narrow, apically reaching distal 1/5 of costal valva; sacculus with a slender finger-shaped dorsal process at basal 1/3; sella broad basally, extending to end of sacculus and forming a slender sharp process, hook-shaped distally. Juxta anchor-shaped, posterior and lateral margins concave medially. Phallus short, approximately half length of valva, with a bundle of spines.

Female genitalia (Fig. 24). Apophyses anteriores about 2 times as long as apophyses posteriores. Anntrum produced backward laterally, forming a pair of rabbit ear-shaped plates widending posteriorly. Ductus bursae with broad sclerite throughout posterior 1/4; sclerite gradually broadened anteriorly, with dentations on anterior end, with roundly inflated bursa protruding from anterior end. Signum sharp at both ends of transversal median carina, posterior margin sharp, anterior margin flat.

Material examined. Holotype ♂, Yonghong Village, Mabian County (28º33′N, 103º24′E; elev. 1500 m), Sichuan, 23 July 2004, coll. Yingdang Ren, genitalia slide No. GQ11188. Paratypes. 1♀, same data as holotype; 1♂, Guadun (27º44′N, 117º38′E; elev. 1100 m), Fujian, 28 July 2008, coll. Weichun Li *et al.*; 1♂2♀, Pingbaying, Xianfeng County (29º24′N, 108º59′E; elev. 1280 m), Hubei, 22 July 1999, coll. Houhun Li; 1♀, Xunyangba, Ningshan County (33º32′N, 108º32′E; elev. 1360 m), Shaanxi, 3 July 2007, coll. Haili Yu.

Distribution. China (Fujian, Hubei, Shaanxi, Sichuan).

Etymology. The specific name is from the Latin *obscurus*, meaning dark, and the suffix *-pterus*, meaning wing, referring to the dark wings.

Checklist of the genus *Circobotys* Butler on a worldwide basis

***Circobotys albimarginata* Wang, sp. nov.**

Distribution. China (Guangxi, Guizhou, Henan, Hunan, Jiangxi, Zhejiang).

***Circobotys arrogantalis* (Tams, 1927)**

Crocidophora arrogantalis Tams, 1927, *in* Caradja, 1927: 412.
Circobotys arrogantalis: Munroe & Mutuura, 1970: 302.

Distribution. China (Sichuan).

***Circobotys aurealis* (Leech, 1889)**

Botyodes aurealis Leech, 1889: 69.
Crocidophora aurealis: Caradja, 1925: 358.
Circobotys aurealis: Mutuura, 1954: 14.

Distribution. China (Fujian, Guangdong, Guizhou, Henan, Hunan, Jiangxi, Sichuan, Zhejiang), Korea, Japan, Russia (Siberia).

***Circobotys aurimargo* Warren, 1896**

Circobotys aurimargo Warren, 1896: 109.

Distribution. India.

***Circobotys brevivittalis* (Hampson, 1896)**

Phlyctaenodes brevivittalis Hampson, 1896: 409.

Circobotys brevivittalis: Munroe & Mutuura, 1970: 302.

Distribution. India.

***Circobotys butleri* (South, 1901)**
Crocidophora butleri South *in*: Leech & South, 1901: 480.
Circobotys butleri: Zhang *in*: Li *et al.*, 2009: 201.
Sinibotys butleri: Yamanaka *in*: Nasu, Hirowatari & Kishida (eds.), 2013: 416.

Distribution. China (Anhui, Henan, Hubei, Guizhou, Zhejiang), Japan.

Remarks. Mano (2009) and Mano & Takasaki (2011) regarded *C. butleri* (South, 1901) that was transferred from *Crocidophora* Lederer, 1863 to the present genus by Li *et al.* (2009) as a member of *Sinibotys* Munroe & Mutuura, 1969. After comparing its characters with those of *Circobotys* and *Sinibotys*, we consider *C. butleri* as a valid species of *Circobotys*.

***Circobotys caffralis* (Hampson, 1910)**
Crocidophora caffralis Hampson, 1910: 502.
Crocidophora velialis Gaede, 1917: 398.
Phlyctaenodes microdontalis Hampson, 1913: 518.
Circobotys caffralis: Maes, 2014: 140.

Distribution. Kenya, South Africa, Tanzania.

***Circobotys cryptica* Munroe & Mutuura, 1969**
Circobotys cryptica Munroe & Mutuura, 1969: 1077.

Distribution. China (Guangxi, Guizhou, Taiwan, Zhejiang), Japan.

***Circobotys elegans* Munroe & Mutuura, 1969**
Circobotys elegans Munroe & Mutuura, 1969: 1069.

Distribution. China (Sichuan, Taiwan).

***Circobotys elongata* Munroe & Mutuura, 1969**
Circobotys elongata Munroe & Mutuura, 1969: 1074.

Distribution. China (Taiwan).

***Circobotys flaviciliata* (Hampson, 1910)**
Crocidophora flaviciliata Hampson, 1910: 502.
Circobotys flaviciliata: Maes, 2014: 140.

Distribution. Congo, Zaire.

***Circobotys flavimarginalis* Wang, sp. nov.**

Distribution. China (Fujian, Guizhou, Jiangxi).

***Circobotys heterogenalis* (Bremer, 1864)**
Omiodes heterogenalis Bremer, 1864: 70.
Crocidophora gensanalis South, *in*: Leech & South, 1901: 481.
Crocidophora heterogenalis: Hampson, 1899: 193.
Circobotys heterogenalis: Mutuura, 1954: 14.
Circobotys heterogenalis onumalis Munroe & Mutuura, 1969: 1071.
Circobotys heterogenalis pertinctalis Munroe & Mutuura, 1969: 1071.
Circobotys heterogenalis anumalis: Hua, 2005: 50. (misspelling).

Distribution. China (Beijing, Chongqing, Guangxi, Guizhou, Hainan, Hebei, Hunan, Jiangsu, Jiangxi, Tianjin); Korea, Japan, Rassia (Far East).

***Circobotys limbata* Moore, 1888**
Circobotys limbata Moore, 1888: 220.

Distribution. India.

***Circobotys mabillealis* (Viette, 1953)**
Stenia mabillealis Viette, 1953: 137.
Circobotys mabillealis: Maes, 2014: 140.

Distribution. Madagascar.

***Circobotys malaisei* Munroe & Mutuura, 1970**
Circobotys malaisei Munroe & Mutuura, 1970: 300.

Distribution. China (Sichuan, Shaanxi), Burma.

***Circobotys minutimacularis* Wang, sp. nov.**

Distribution. China (Shaanxi).

***Circobotys nigrescens* (Moore, 1888)**
Hapalia nigrescens Moore, 1888: 221.
Circobotys nigrescens: Munroe & Mutuura, 1970: 302.

Distribution. India.

***Circobotys nycterina* Butler, 1879**
Circobotys nycterina Butler, 1879: 77.
Crocidophora nycterina: Hampson, 1899: 193.
Crocidophora nycterina intermedialis Caradja, 1925: 357.

Distribution. China (Fujian, Guangdong, Hubei, Hunan, Zhejiang), Japan.

***Circobotys obscuralis* (South, 1901)**
Crocidophora obscuralis South, 1901: 481.
Circobotys obscuralis: Munroe & Mutuura, 1969: 1074.
Circobotys obscuralis ahyoui Munroe & Mutuura, 1969: 1073.

Distribution. China (Sichuan, Yunnan).

***Circobotys obscuriptera* Wang, sp. nov.**

Distribution. China (Fujian, Hubei, Shaanxi, Sichuan).

***Circobotys occultilinea* (Walker, 1863)**
Crambus occultilinea Walker, 1863:168.
Pyrausta petrosarca Lower, 1903: 68.
Pyrausta apocrypha Turner, 1908: 101.
Circobotys occultilinea: Shaffer *et al.*, 1996: 190.

Distribution. Malaysia, Australia.

***Circobotys plebeia* Munroe & Mutuura, 1969**

Circobotys plebeia Munroe & Mutuura, 1969: 1071.

Distribution. China (Shaanxi).

***Circobotys serratilinearis* Wang, sp. nov.**

Distribution. China (Yunnan).

***Circobotys sinisalis* (Walker, 1859)**
Botys sinisalis Walker, 1859: 635.
Circobotys sinisalis: Maes, 2014: 140.

Distribution. Congo.

***Circobotys sinuata* Wang, sp. nov.**

Distribution. China (Hainan).

***Circobotys unicolor* Wang, sp. nov.**

Distribution. China (Sichuan).

Funding This study was supported by the National Natural Science Foundation of China (31672372).

References

Bremer, O. 1864. Lepidopteren Ost-Sibiriens, insbesondere des Amur-Landes, gesammelt von den Herren G. Radde, R. Maack und P. Wulffius. *Mémoires de l'Académie des Sciences de St-Pétersbourg*, St. Petersburg (ser. 7), 8(1): 1–104, pls. 1–8.

Butler, A.G. 1879. *Illustrations of typical specimens of Lepidoptera Heterocera in the collection of the British Museum. Vol. 3.* British Museum (Natural History), London. pp. 1–82, pls. i–xviii, col. pls. 41–60

Caradja, A. 1925. Ueber Chinas Pyraliden, Tortriciden, Tineiden nebst kurzen Betrachtungen, zu denen das Studium dieser Fauna Veranlassung gibt, (Eine biogeographische skizze). *Mémoriile Sectiunii Stiintifice, Academia Romana*, (3)3(7): 257–383.

Caradja, A. 1927. Die Kleinfalter der Stötzner'schen Ausbeute, nebst Zuträge aus meiner Sammlung (Zweite biogeographische Skizze: "Zentralasien"). *Mémoriile Sectiunii Stiintifice, Academia Romana*, (3)4(8): 361−428.

Hampson, G.F. 1896. *The Fauna of British India, including Ceylon and Burma. Vol. 4.* London. xxviii pls, 594pp.

Hampson, G.F. 1899. A revision of the moths of the subfamily Pyraustinae and family Pyralidae. Part II. *Proceedings of the General Meetings for Scientific Business of the Zoological Society of London*, 1899: 172–291.

Hampson, G.F. 1910. Zoological collections from Northern Rhodesia and adjacent territories: Lepidoptera Phalaenae. *Proceedings of the General Meetings for Scientific Business of the Zoological Society of London*, 1910(2): 388–510, pls. 36–41.

Hampson, G.F. 1913. Descriptions of new species of Pyralidae of the subfamily Pyraustinae. *Annals and Magazine of Natural History*, (8)11(66): 509–530.

Hua, L.Z. 2005. *List of Chinese Insects, 3.* Sun Yat-Sen University Press, Guangzhou. 595pp.

Nasu, Y., Hirowatari, T., Kishida, Y. (eds.) 2013. *The Standard of Moths in Japan, 4*. Gakken Education Publishing, Tokyo. 552pp.

Leech, J.H. 1889. New species of Deltoids and Pyrales from Corea, North China, and Japan. *The Entomologist*, 22(310): 62–71, pls. 2–4.

Leech, J.H., South, R. 1901. Lepidoptera Heterocera from China, Japan, and Corea. Part V. *Transactions of the Entomological Society of London*, 1901: 385–514.

Lederer, J. 1863. Beitrag zur Kenntniss der Pyralidinen. *Wiener Entomologische Monatschrift*, 7(8, 10–12): 243–280, 331–504, pls. 2–18.

Li, H.H. *et al.* 2009. *Lepidoptera: Pyraloidea. Insect Fauna of Henan*. Science Press, Beijing. 440 pp.

Lower, O.B. 1903. Descriptions of new Australian Noctuina, etc. *Transactions of the Royal Society South Australia*, 27: 27–74.

Maes, K.V.N. 2014. Notes on the Crambidae of Africa with new synonyms and combinations (Lepidoptera, Pyraloidea, Crambidae). *Lambillionea*, 114(2): 139–143.

Mano, T. 2009. Record of *Sinibotys butleri* (South) (Crambidae) from Nagoya City, Aichi Prefecture, Honshu, Japan. *Yugato*, 197: 116.

Mano, T., Takasaki, Y. 2011. A breeding record of *Sinibotys butleri* (South) (Crambidae) with description of its larva and pupa. *Yugato*, 204: 41–46.

Moore, F. 1888. Descriptions of new Indian lepidopterous insects from the collection of the late Mr. W.S. Atkinson. Heterocera (continued) (Pyralidae, Crambidae, Geometridae, Tortricidae, Tineidae). *In*: Hewitson, W.C., Moore, F. (eds.), *Descriptions of New Indian Lepidopterous Insects From the Collection of the Late Mr. W.S. Atkinson* 3. Asiatic Society of Bengal/ Taylor & Francis, Calcutta / London. pp. 199–299, pls. 6–8.

Munroe, E.G., Mutuura, A. 1969. Contributions to a study of the Pyraustinae (Lepidoptera: Pyralidae) of Temperate East Asia VII. *The Canadian Entomologist*, 101(10): 1069–1077.

Munroe, E.G., Mutuura, A. 1970. Contributions to a study of the Pyraustinae (Lepidoptera: Pyralidae) of Temperate East Asia IX. *The Canadian Entomologist*, 102(3): 294–304.

Mutuura, A. 1954. Classification of the Japanese *Pyrausta* group based on the structure of the male and female genitalia (Pyr.: Lep.). *Bulletin of the Naniwa University, Ser. B*, 4: 7–33.

Nuss, M. *et al.* 2003–2016. Global Information System on Pyraloidea. Available from http://www.pyraloidea.org (accessed 30 Auguest 2016)

Shaffer, M., Nielsen, E.S., Horak, M. 1996. Pyraloidea. *In*: Nielsen, E.S., Edwards, E.D., Rangsi, T.V. *Checklist of the Lepidoptera of Australia*. *In*: Nielsen, E.S., *Monographs on Australian Lepidoptera*, *4*. CSIRO Division of Entomology, Canberra. pp. 164–199.

Walker, F. 1863. *List of the Specimens of Lepidopterous Insects in the Collection of the British Museum.Vol. 27. Crambites & Tortricites.* Edward Newman, London. 286pp.

Warren, W. 1896. New species of Pyralidae from the Khasia Hills. *Annals and Magazine of Natural History*, (6)18: 107–119.

Tams, W.H.T. 1927. *In*: Caradja, A. Die Kleinfalter der Stötzner'schen Ausbeute nebst Zuträge aus meiner Sammlung (Zweite biogeographische Skizze: "Zentralasien"). *Memoriile Sectiunii Stiintifice. Academia Romana (ser. 3)*, 4(8): 361–428.

Turner, A.J. 1908. New Australian Lepidoptera of the families Noctuidae and Pyralidae. *Transactions of the Royal Society South Australia*, 32: 55–109.

Viette, P. 1953. Nouvelles Pyrales de Madagascar. *Revue Française d'Entomologie*, 20(1): 130–137.